REMARKS

Claims 1, 3-16 and 18-29 are pending in the application. Claims 1, 19, 20, 28 and 29 have been amended. Claim 2 has been canceled. No new matter has been added. Reconsideration of the claims is respectfully requested.

The Office Action summary indicates that all pending claims, 1-16 and 18-20 are rejected. In the Detailed Action it is indicated that all claims are subject to a provisional double patenting rejection, but only claims 1-7, 10 and 18-29 are the subject of prior art rejections. The Examiner did not give any indication that claims 9 and 11-16 are allowable or rejectable over the prior art. The Examiner is requested to clarify the status of claims 9 and 11-6 in the next action. If claims 9 and 11-16 are subject to a prior art rejection in a subsequent office action, based on art used in the present action, it is requested that the subsequent action not be a final action, since Applicant has not been provided the opportunity to address such rejections of claims 9 and 11-16.

Provisional Double Patenting Rejections

Claims 1-16 and 18-29 were provisionally rejected under the judicially created doctrine of obvious-type double patenting as being unpatentable over claims of copending applications 10/014,278 and 10/014,277.

Applicant notes that these double patenting rejections are provisional. These rejections will not be addressed until one of the applications, either the applications used as the basis for the rejections, or the present application, is issued as a patent: Application Serial No. 10/014,278 is still pending and a Notice of Allowance has been issued in Application Serial No. 10/014,277. At that time, Applicant will be able to properly address the provisional double patenting rejection according to MPEP § 804. Applicant does not acquiesce to the reasons stated for the provisional double patenting rejections.

Rejection under 35 U.S.C. § 102

Rejection of claims 1, 3, 10 and 19 under Pratt

Claims 1, 3, 10, and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by Pratt (WO 95/20144). Pratt teaches an optical wavelength sensor in which light from the laser source (1) is directed to an etalon (4) whose faces (7, 8) are slightly out of parallel, and so the thickness

of the etalon varies between a minimum value, d_{min} and a maximum value of d_{max}. An array of detectors (5) is placed behind the etalon to detect the pattern in the light that is transmitted through the etalon.

The invention of claim 1 is directed to a method of stabilizing the operating wavelength of a laser. The method comprises illuminating an optical element with light output from the laser to produce an interference pattern, the optical element being a non-parallel etalon. The interference pattern arises from interference between optical surfaces of the etalon that are not parallel to each other. The interference pattern is reflected by the optical element to a detector unit. At least three different portions of the interference pattern are detected with at least three detector elements of the detector unit to generate at least three respective detection signals. A feedback signal is generated using the at least three detection signals. The operating wavelength of the laser is adjusted in response to the feedback signal.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Therefore, all claim elements, and their limitations, must be found in the prior art reference to maintain a rejection based on 35 U.S.C. §102. Applicant respectfully submits that Pratt does not teach every element of claim 1, and therefore fails to anticipate claim 1.

In particular, Pratt fails to show reflecting the interference pattern from the optical element to the detector unit. Instead, Pratt teaches that the detector unit is placed to detect the transmitted interference pattern, not the reflected interference pattern.

Claim 1 was amended to include features from cancelled claim 2, that the optical element generating the interference pattern reflects the interference pattern to the detection unit. Claim 2 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Pratt and Chang (U.S. Patent No. 6,233,263). There would be no motivation for this proposed combination, however, and so it is an improper combination. Pratt teaches, at page 2, lines 3-7, "with such wavemeters that operate in reflection, there is an inherent limitation on the wavelength resolution that can be achieved and it would be difficult to use the known [Fizeau] wavemeter to

resolve WDM channels in an optical telecommunications system." Thus, Pratt specifically teaches against detecting interference fringes in reflection, because of an alleged lack of resolution. Accordingly, one of ordinary skill in the art would not be motivated to combine Pratt's teachings with those of Chang in the manner alleged in the Office Action.

Accordingly, claim 1 is allowable over Pratt and the combination of Pratt with Chang.

Claims 3 and 10 depend from claim 1, and so are also allowable.

The invention of claim 19 is directed to a system for stabilizing an operating wavelength of a laser. The system includes, *inter alia*, that the non-parallel etalon reflects the interference pattern towards the means for detecting the at least three different portions of the interference pattern.

Pratt fails to teach this. Pratt teaches, instead, that the interference pattern is transmitted to the detector. Accordingly, claim 19 is not anticipated by Pratt.

Claims 1, 20 and 29 are rejected under 35 U.S.C. § 102(e) as being anticipated by Rinaudo et al. (U.S. Patent No. 6323,987). Rinaudo teaches a multi-wavelength etalon suitable tuning and maintaining the operating frequency of a laser used in an optical communication system (abstract). The etalon (30) is a stepped etalon, with detectors (16a-16c) placed behind respective steps (14a-14c) (col. 14, lines 37-47).

Rinaudo fails to teach the all the elements of each of claims 1, 20 and 29.

Regarding claim 1, Rinaudo fails to teach forming interference fringes between optical surfaces that are non-parallel. Instead, Rinaudo's etalon is stepped with faces that are parallel to each other. Accordingly, Rinaudo fails to anticipate claim 1.

The invention of claim 20 is directed to a method of monitoring light output by a laser. The method comprises producing a periodic optical interference pattern by illuminating an optical element with the light output by the laser and detecting at least three different portions of the periodic optical interference pattern to generate at least three respective detection signals. A power signal indicative of output power from the laser is generated using the at least three detection signals and the wavelength of the light output by the laser is stabilized using the at least three detection signals.

The invention of amended claim 29 is directed to a system for monitoring light output by a laser. The system includes means for producing a periodic optical interference pattern and means

for detecting at least three different portions of the periodic optical interference pattern to generate at least three respective detection signals. The system also includes means for generating a power signal indicative of output power from the laser using the at least three detection signals; and means for stabilizing the wavelength of the light output by the laser using the at least three detection signals.

Rinaudo fails to teach the generation of a signal indicative of the output power of the laser using the same at least three detection signals as are used for stabilizing the frequency of the laser. Rinaudo does refer to "intensity signals 63" (col. 7, line 48), but that term must be understood in view of the preceding description found at col. 7, lines 29-32), namely that a "photodetector array 32 is placed in alignment with the etalon 30 and produces detection signals 63 which indicate the intensity of light transmitted by each step of the etalon 30." Therefore, the term "intensity signals" merely refers to the individual signals produced by each step of the etalon. Rinaudo completely fails to teach that these "intensity signals" (63) may be used to generate a signal that indicates the power emitted by the laser.

Accordingly, Rinaudo fails to teach all the elements of claims 20 and 29, and these claims are not anticipated by Rinaudo.

Rejections under 35 U.S.C. § 103

Rejection of Claims 4-6, 7, 18 based on Pratt

Claims 4-6 are rejected under 35 U.S.C. § 103(a) being unpatentable over Pratt in view of Ackerman et al. (U.S. Patent No. 6,186,937) (Ackerman). It is stated in the Office Action that Pratt teaches all the elements of the claims except for the claimed spacing of the detectors. It is further stated that Ackerman does show a device with detectors spaced at P/n, and that it would have been obvious for one of ordinary skill in the art to have spaced the detectors at P/n to sample the useful portions of the spectra.

Ackerman teaches a method and device for obtaining a desired of an optical characteristic of a Fabry Perot etalon (abstract). The etalon 110 is a plane/parallel etalon having entrance and exit surfaces (112 and 114), and with a detector array (120) placed on the far side of the etalon from the light source (200).

Ackerman fails to remedy the deficiencies of Pratt discussed above. In particular, Ackerman teaches the detection of an interference fringe pattern in transmission, not reflection.

Furthermore, Ackerman fails to teach, with respect to claim 6, a detector unit that includes additional detector elements positioned to detect phase positions of the interference pattern corresponding to phase positions of the interference pattern detected by the at least three detector elements, the additional detector elements being spaced from their corresponding ones of the at least three detector elements by an integral number of periods.

Accordingly, claims 4-6 are not obvious in view of the proposed combination of Pratt and Ackerman, and are patentable thereover.

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Pratt and Ackerman and further in view of Rinaudo and Schwartz. It is stated that Pratt and Ackerman fail to teach the feedback control for the laser intensity, but that Rinaudo shows that it is better to control both the wavelength and intensity, and that Schwartz shows that the sum of the detected signals is proportional to the intensity of the incident beam.

This rejection is confusing. Claim 7 is directed to the method of claim 6, further comprising summing detection signals from the at least three detector elements and their respective additional detector elements to form summed signals for each phase portion of the interference pattern detected by one of the at least three detector elements, and generating the feedback signal using the summed signals. (emphasis added) In other words, the signal from the first detector element is summed with the signals from its respective additional detector elements that detect the same phase portion of the interference pattern. Likewise the signals from the second and third detector are summed with the signals from their respective additional detector elements that detect the respective same phase portions of the interference pattern.

The description of the rejection implies that this claim is understood to be directed to intensity feedback control based on an intensity signal formed by summing detector signals. This is an incorrect characterization of the claim. One embodiment of a system covered by the claim is shown in FIG. 5, in which more than one detector element is used to form a signal related to a single phase of the interference pattern. In the embodiment illustrated in FIG. 5, for example, the signals from detectors 534a and 534d are summed together to form the R phase signal. Likewise, signals from detectors 534b and 534e are summed to form the phase signal S and signals from detectors 534c and 534f are summed to form the phase signal T. While R, S, and T may be summed to produce a laser power signal, this is not the subject matter of this claim. The subject matter of this

claim is that the phase signals, R, S, and T, may be formed using signals from more than one respective detector element.

Neither Rinaudo nor Schwartz teach or suggest the summing of signals from detector elements to form summed signals for each phase portion of the interference pattern. Thus, the proposed combination of elements fails to teach or suggest all the elements of the claimed invention and so claim 7 is patentable over the proposed combination of references.

Claim 18 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Pratt in view of the prior art disclosed by applicant. It is stated in the Office Action that Pratt does not show choosing one of a number of UTI standard operating wavelengths. Applicant believes that the Examiner intended to state that Pratt does not show choosing one of a number of ITU (International Telecommunications Union) wavelengths. Claim 18 depends from claim 1, which is allowable over Pratt. Therefore, claim 18 is also allowable.

Rejections of Claims 20-24 and 26-29 based on Russell and Schwartz

Claims 20-24 and 26-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Russell (U.S. Patent No. 6,151,114) in view of Schwartz. It is stated that Russell shows the invention of claim 20 except for generating the power signal indicative of the output power from the laser using the at least three detection signals, but that Schwartz shows a monochromicity detector using an etalon in which it is taught that the sum of all signals is proportional to the intensity of the incident light. It is further stated that, at the time of the invention, one of ordinary skill would have summed the detected signals in order to ascertain the intensity of the incident light.

Russell teaches a coherent laser warning system in which incident light (10) from a remote source is incident on a detector (12). The detector includes a spectral bandpass filter (14) that eliminates light outside the range of interest, followed by a "wedge etalon" (18) and a photodetector array (30) (col. 3, line 55 – col. 4, line30). The incident light produces constructive interference at several locations along the width of the etalon, which is detected by the photodetector array. A spatial Fourier transform of the light pattern incident on the detector is used to determine whether the incident light is coherent or incoherent (col. 3, lines 43-47).

Schwartz teaches a monochromaticity detector that produces a diffraction or interference pattern from a remote source and a detector array to detect the pattern. The spatial intensity is periodic at the detector if the incident light is monochromatic (Abstract). Schwartz further states, col. 2, lines the difference between the outputs of detector elements 22 and 24 will be large and the sum of the outputs from elements 22 and 24 will be proportional to the total incident intensity.

Three criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference, or combination of references, must teach or suggest all the claim limitations. MPEP § 2142. Applicant respectfully traverses the rejection since the prior art fails to disclose all the claim limitations, and there would be no motivation to combine the references in the manner suggested in the Office Action.

The proposed combination of references fails to teach all the elements of the invention of claim 20. In particular, the proposed combination of references fails to teach stabilizing the wavelength of the laser light using the three detection signals that were also used to generate the power signal. Instead, Russell teaches a device that determines whether incident light is coherent and Schwartz teaches a device that determines whether incident light is monochromatic. Both Russell and Schwartz are related to remote sensing systems: neither reference teaches using its detector to control a laser system or a way of stabilizing a laser system.

Furthermore, neither reference teaches how to generate a signal indicative of the power of the laser output. Schwartz merely teaches that the sum of the signals is proportional to the incident intensity. However, the light incident at the detectors has to be related in some manner to the power of the light produced by the laser itself. Neither reference teaches this and, indeed, cannot, because they are concerned with remote sensing systems that have no knowledge about the source being detected. In contrast to this, the present invention produces a signal indicative of the power that the laser produces. This may include, for example, knowledge of factors needed for correct calibration, such as the shape of the intensity envelope incident on the detectors discussed in the present application at page 18, lines 21-24.

Thus, the proposed combination of references fails to teach a system that provides the advantage of being able to determine the output power from the laser in addition to being able to stabilize using the same three detection signals. Prior to the present invention, no laser

stabilization system provided for the combined use of detection signals for power measurement and laser stabilization.

Accordingly, the proposed combination of references fails to teach all the elements of claim 20, and claim 20 is patentable thereover.

Claims 21-24 and 26-28 are dependent from claim 20 and are, therefore, also patentable over the proposed combination of references.

Turning now to claim 29, the proposed combination of references fails to teach or suggest means for generating a power signal indicative of the power output from the laser using the at least three detection signals and means for stabilizing the wavelength of the light output by the laser using the same three detection signals. Accordingly, the proposed combination of references fails to teach all the elements of claim 29, and claim 29 is patentable over the prior art.

Rejection of Claim 25

Claim 25 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Russell and Schwartz, and further in view of Chang. It is stated that Russell and Schwartz do not teach the interference pattern being reflected, but that Chang does teach the use of a reflector to reflect the interference pattern, and that it would be obvious to introduce a reflector since folding the pat by using a mirror allows flexibility in the arrangement, thus enabling a different sized apparatus.

Claim 25 depends from claim 20. Chang fails to correct the deficiencies of Russell and Schwartz with regard to claim 20 discussed above.

Furthermore, Applicant respectfully asserts that the motivation to combine Chang with is incorrect. According to the motivation provided in the Office Action, the use of a mirror allows flexibility in the arrangement. Applicant respectfully points out that claim 25 does not introduce the use of a mirror. Claim 25 is, instead, related to producing the periodic optical interference pattern by reflecting at least a portion of the light produced by the laser off the optical element that produces the optical interference pattern. Thus, the element that creates the interference pattern does so in reflection, not transmission. No mirror is introduced according to this claim.

Thus, since the alleged motivation to combine the references fails, and since Chang fails to correct the deficiencies of the combination of Russell and Schwartz, claim 25 is patentable.

Conclusions

In view of the reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Iain A. McIntyre at 612-436-9610.

Respectfully submitted,

CCVL P.A.
Customer Number 38846

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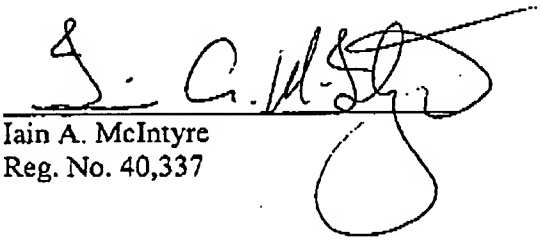
By: 
Iain A. McIntyre
Reg. No. 40,337